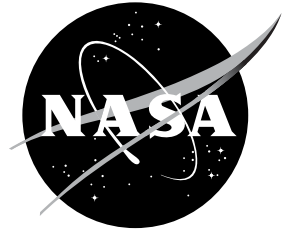


# NASA Facts

National Aeronautics and  
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Address by the Honorable Sean O'Keefe  
NASA Administrator  
Maxwell School of Citizenship & Public Affairs  
Syracuse University  
April 12, 2002

## "Pioneering the Future"

Thank you, Dean. It is a pleasure to be here at the Maxwell School, the nation's preeminent school of Public Affairs. This is also something of a homecoming given that I earned my graduate degree here and later served on the public administration faculty. And while this is also the oldest program dedicated to the important business of governance—nearly 80 years now—I hasten to add for the benefit of students here—I am not among the oldest of alums from this distinguished institution!

I have been NASA's Administrator for only a few months. I have begun my tenure at NASA getting to know the agency better, to understand what we do and how we do it.

I knew, of course, that NASA is the world's leading aeronautics and aerospace research organization. NASA's feats of engineering are unprecedented and unparalleled throughout its storied 44-year history.

But what continues to amaze me is the energy and the enthusiasm and the commitment of our people... and the way in which they work together—and with other organizations—to achieve the impossible.

In broad terms, our mandate is to pioneer the future ... to push the envelope ... to do what has never been done before. An amazing charter indeed ... NASA is what Americans ... and the people of the world ... think of when the conversation turns to the future.

Pioneering the future is certainly something Abraham Lincoln would have understood, and given the reverence with which he is held here at Maxwell, I think it well that we follow his advice to "distant the beaten path and seek regions hitherto unexplored." At NASA we indeed venture to regions unexplored and unknown.

So in the end, NASA is about creating the future ... and our greatest asset in fulfilling this demanding charter is the excellence of our people

And therefore I'd like to begin today by telling you a little about some of the extraordinary folks I've been privileged to meet over the past months.

Take Eileen Collins. What a remarkable young woman she is—test pilot, test pilot instructor, commander of space shuttle missions, slated to fly again as shuttle commander in January, and mother of a lovely little girl who probably thinks that everybody's mom goes to space. I might also add, Eileen is an alum from this great institution. She earned her undergraduate degree here the same year I completed graduate studies.

And then there is veteran astronaut Dr. Shannon Lucid who holds the record for the longest time in space by any American—but not for long.

The current crew of the International Space Station, Russian cosmonaut and mission Commander Yury Onufrienko and US astronauts Navy Captain Dan Bursch and Air Force Colonel Carl Walz, are on line to break Shannon's remarkable record of 188 continuous days in space.

Her record was born of an extended duration owing to technical complications with the space shuttle. You will recall that her mission began in 1996 and was scheduled to last four and a half months.

NASA extended her time aboard by six weeks, however, because shuttle engineers needed time to study and understand abnormal burn patterns on the solid-fuel boosters from a previous shuttle flight. This was a safety issue that presented Shannon with the challenges of an unanticipated longer stay ... Shannon conquered those challenges brilliantly ... and patiently.

In her new role as NASA's Chief Scientist Dr. Lucid will be on hand to congratulate the Expedition Four crew for their accomplishment when they return in June. I want to say a little bit more about Shannon's dedication to NASA.

When I appointed Shannon to her new position at NASA Headquarters in Washington I expected her to report to work right away. She took the assignment, however, with one condition ... that she be permitted to finish her job as CapCom, or mission communicator, with the crew of STS-110 that is currently in orbit.

Shannon did not want anything—not even a prestigious assignment in Washington—to get in the way of the planning and successful execution of this mission ... and in the meantime, this Chief Scientist portfolio will simply have to wait.

Right now there are 10 people orbiting our planet. The three-man crew of Expedition Four has been living on the International Space Station since December 5th—today 128 days into their mission. They have company now with the visiting space shuttle crew that has gone to the space station to install the critical lead segment of a support structure for several station components.

Doing this, of course, requires walking in space. The astronauts make the job look easy, but I've been told that assembling the station in space is like trying to change a sparkplug wearing roller skates and two pairs of ski gloves with all your tools, screws and materials tethered to your body so they won't drop into the engine ... and by the way, you and the thing you're working on are travelling at 18 thousand miles per hour.

Couple that with living and working on the station. It's like building one room of a house, moving in a family of three and asking them to finish building the house while they work full-time from home. And in between the station assembly tasks... they are constantly busy with research experiments and scientific observation.

The solar array surface area currently on orbit is 9600 square feet, about what it would take to cover the infield of a major league baseball diamond.

When completed, the International Space Station itself will measure 361 feet end-to-end. That's the equivalent of a football field, including the end zones. That's four times larger than the former Russian space station, Mir, and about five times larger than Skylab.

Most important is the fact that the International Space Station gives us an unparalleled research facility in space. With the space shuttle our research was limited to just a few days in orbit, and just a few times a year. For the past 18 months we have had a permanent research lab operating 24-7 for experiments in the life sciences, physical sciences, and other fields.

Overall, this mission has been fascinating to watch. The astronauts and the ground team make it look so easy, but it takes years of planning and rehearsing to make it look that way.

There's another astronaut I'd like to mention whose list of degrees reads almost as long as that of an entire shuttle crew. That is Story Musgrave—a 1958 graduate of Syracuse University.

Dr. Musgrave retired from the astronaut corps in 1997 after a 30-year career that included six space shuttle flights, including the maiden flight of Challenger in 1983 and first Hubble Space Telescope servicing mission in 1993. He is the only astronaut to have flown on all five Space Shuttles.

He is also a pilot, a physician, and using his own words, "a mechanic, poet and philosopher." I often wonder if Dr. Musgrave needs sleep and rest like the rest of us.

His degree from Syracuse is in math and statistics. He also has an undergraduate degree in chemistry and master's degrees in business, physiology, biophysics, and literature, and a doctorate in medicine.

On the Hubble servicing mission he helped bring to life an asset that had been roundly criticized as a failure. From the data and imagery streaming back from the telescope since Musgrave's mission in 1993, astronomers have been rewriting the textbooks. Indeed, we have been driven to revise our understanding of the age, origins and expansion of the universe since that seminal mission. And the upgrades continue. Just last month, the STS-109 crew serviced Hubble to improve the imagery by a factor of 10.

Dr. Musgrave, a product of this university, is indeed an American space icon and a person who continues to share his unique, cross-discipline view of the human experience in space with audiences across the world.

Part of my job as Administrator is to remind everyone of what NASA does and what we are capable of doing. It's a responsibility I take very seriously. I believe we are at a crossroad in NASA's history ... We have an opportunity here and now to reinvigorate the agenda and renew the entrepreneurial spirit present at NASA's beginning—a continued characteristic of American culture.

Some believe NASA has lost its focus and that the pioneering spirit, the excitement of NASA's mission is gone. But believe me, that spirit is alive and well. We intend to nourish it.

The Nobel laureate Steven Weinberg said,

"The effort to understand the universe is one of the very few things that lifts human life a little above the level of farce and gives it some of the grace of tragedy."

Our effort to understand the universe is to answer the most fundamental of questions. How did we get here? Where are we going? Are we alone?

What NASA needs now is a roadmap to continue our work in a more efficient, collaborative manner. Our imperative is not only for the sake of knowledge—it is for our future and our security.

Today I am introducing a new strategic framework and vision for NASA. It is a blueprint for the future of exploration. It is a roadmap for achievement that we hope will improve the lives of everyone in this country and everyone on this planet.

That is a bold statement, I know. But, I am confident in saying this because the unique work that NASA does truly touches all of our lives.

This is NASA's vision for the future. Our mandate is:

- To improve life here,
- To extend life to there,
- To find life beyond

To improve life here is self-explanatory. From medical devices to better tires, many of the products we use and experience every day have their origins in NASA technology. The American taxpayers' investment in NASA pays off every day in spin-off technology. But that's not enough.

We live in a new reality now. With the tragedy of September 11 we were forced to see how the freedom and open way of life we enjoy makes us vulnerable. The attack and events that followed reinforced how physical and economic security go hand in hand. Now more than ever in our recent history, it is important that we look at our country as whole, rallying our assets and talents toward common goals. NASA's capabilities can be marshaled to support the goal of providing for our security.

The second point in the vision is to extend life to there. Where is there? Everybody has a favorite candidate ... and that's a good thing ... but wherever we want to go, we currently have a limited means to get there—and we must overcome these limitations.

We will go where the science dictates that we go, not because it's close or popular.

We are going where the fundamental questions that we seek to answer take us. That's the big change. NASA's mission, which I'll discuss in a moment, must be driven by the science, not by destination. And while policy and politics and economics are inevitable factors, science must be the preeminent factor.

And that leads me to the final point in the vision ... to find life beyond. That is the fundamental, most compelling question known to humankind. Are we alone in the universe?

NASA's lead space scientist, Dr. Ed Weiler, refers to this inquiry as the quest to sweep the last crumb from the plate of human arrogance.

Are we alone? NASA, with telescopes, space-borne observatories, robotic and human explorers, we will find out.

This is very heady and some would say esoterical. But it translates into everyday life.

Let me take you on a journey to the year 2030.

- We have sought life's abodes: NASA missions have mapped continents on dozens of planets circling nearby stars, some of which show signs of life-supporting atmospheres. Evidence continues to mount for other origins of life on planets within our own Solar System, as revealed by advanced generations of robotic explorers. Humans and their robotic partners assembled complex science facilities in space to unveil even more challenging cosmic questions.
- We understand our home: NASA's missions revealed the complex interactions among the Earth's major systems, vastly improving weather, climate, earthquake, and volcanic eruption forecasting – and the impact that our Sun has on our living world.
- We have connected the world's citizens: NASA's technologies have resulted in dramatic improvements in air transportation via “green” aircraft, higher-speed international travel, and innovative measures to reduce aircraft accidents and delays.
- We have enabled new commerce: Low Earth Orbit has become a rapid-growth economic zone, with commercial industries taking advantage of low-gravity, abundant solar energy, lower-cost access from the Earth's surface, and a vista that encompasses the entire planet.
- We share the vision and the experience: Throughout the world, students in earthbound classrooms are learning the fundamentals of physics, math, and technology as they actively participate with space travelers via “telepresence technology.”
- **And we continue to prepare the way for humanity's greatest adventures.**

It's quite a world in 2030, and many of the improvements to life on Earth began at NASA.

So, how do we get to that impressive picture of the future? Part of the answer is by executing NASA's mission:

- To understand and protect our home planet
- To explore the Universe and search for life
- To inspire the next generation of explorers  
... as only NASA can

Let me explain what this mission statement means and how it charts our direction for the future.

The first part of the mission not only touches home, it is **about** home.

### **To understand and protect our home planet**

We have come to understand that the only way to really comprehend our climate and to protect the scarce resources of our little blue planet is to look at the Earth as a single, whole system.

This holistic approach allows us to see how the oceans affect climate on land, for example, and how natural and man-made environmental hazards in one part of the world affect other parts of the world.

From the unique vantage point of space we can see, and more importantly, predict, how dust storms in the Sahara will affect crops in the American Midwest. From the unique vantage point of space we can predict how mosquito-borne diseases will spread. From the unique vantage point of space we can tell a farmer what part of her field needs fertilizer and which part does not.

The mission is to understand and protect our planet. Protection includes using our scarce resources to improve life on Earth by living in an environmentally sound manner. NASA's contribution will be to help collect the data the President has called for to frame the policy choices we must consider to meet the challenges of climate change and establish responsible international environmental standards.

Protection of our planet also includes changing our transportation systems on Earth so that they are friendly, efficient and environmentally safe. In the future airports will be more efficient, safe travel hubs.

Protection of our home planet includes sharing NASA's unique technology and imagery with other government agencies, academia and industry, to thwart those who seek to do harm or arrest trends that diminish our quality of life.

It is not a technology leap to design systems to preclude the use of commercial aircraft as weapons. This goal we're working on is an imperative inspired by the events of September 11, which touched us all—and NASA was no exception.

A few weeks ago, the crew of STS-108 visited Washington. If you remember, this was a crew exchange flight ... taking Expedition Four to the International Space Station ... and bringing the crew of Expedition Three home.

But this was more than a space station crew exchange. It was an emotional mission. On December 11, the crew participated in a worldwide three-month remembrance of the September 11 terrorist attacks.

The crew brought home Expedition Three from the International Space Station, including Commander Frank Culbertson ... who was the only American not on this planet at the time of the attacks. One of his close friends was the pilot of the airplane that terrorists commandeered to hit the Pentagon ... and in doing so, took the life of Brady Howell, a Maxwell alum, a Presidential Management Intern, a former graduate assistant of mine, a young man with a bright, promising future in public service.

Commander Culbertson, a Naval aviator, was on board the space station at the time of the attacks ... from an altitude of 250 miles above the Earth, he could see the smoke billowing from the World Trade Center ... and he captured the first images of that tragedy from space.

We were all moved by his words on that day. He thought of his own family and mourned for the lives lost.

To contribute meaningfully to this goal of protection of our home planet, we must emphasize the theme of collaboration and synergy. NASA's job is to develop the technologies of the future to meet its mission and then to turn that technology loose so that government and America's entrepreneurs can turn them into products for the greater good to serve the important objective of protection.

To the second theme:

### **To explore the Universe and search for life**

One of the fundamental questions NASA seeks to answer is the oldest question in history: Are we alone?

NASA will use its technology to explore, first with robotic trailblazers, and eventually humans ... as driven by these compelling scientific questions:

- How did we get here?
- Where are we going?
- Are we alone?

Next year we will launch the Space InfraRed Telescope Facility, or SIRTf, the last of NASA's four Great Observatories.

Giant clouds of gas and dust block most of the Universe from view. SIRTf will lift "the cosmic veil," looking through these clouds to reveal stars forming in the heart of dusty galaxies, brown dwarfs, and even galaxies that existed near the beginning of time. It will also be able to characterize the disks of gas and dust around stars from which planets eventually form. SIRTf will do for infrared astronomy what the Hubble Space Telescope has done in its unveiling of the visible universe.

The Galaxy Evolution Explorer, or GALEX—scheduled to launch later this year—will use an ultraviolet telescope during its two-year mission to explore the origin and evolution of galaxies and the origins of stars and heavy elements. GALEX will detect millions of galaxies out to a distance of billions of light years and also will conduct an all-sky ultraviolet survey.

These are just two of a host of planned missions that will continue to force the rewriting of the textbooks, just as Hubble has done and will continue to do. It is an exciting time, indeed, for astronomers and astrophysicists and what they will learn will inform the rest of us about the vast universe we live in.

Our third mission ...

### **To inspire the next generation of explorers**

Our mission of understanding and protecting our home planet and exploring the Universe and searching for life will not be carried out if we don't have the people to do it.

Today, America has a serious shortage of young people entering the fields of mathematics and science. This critical part of our mission is to inspire the next generation of explorers so that our work can go on. This educational mandate is an imperative.

And there is reason for concern about the future if we fail to address this concern.

The US Commission on National Security for the 21st Century—the Hart-Rudman Commission—has this to say:

The harsh fact is that the US need for the highest quality human capital in science, mathematics, and engineering is not being met. Given the exigencies of advanced 21st century economies, it is not good enough that we produce a sufficient elite corps of science, math, and engineering professionals. We must raise levels of math, science, and technology literacy throughout our society.

While employment opportunities in science and engineering are expected to increase at a rate almost four times greater than for all other occupations through this decade, enrollment in science and engineering college courses has been in decline. Our best and brightest are being drawn into other professions.

We would be remiss in our public trust if we do nothing to reverse this trend of scientific proficiency. More than one-fourth of the existing national technical workforce is over 50 years old. NASA's situation is even more critical. Our under-30 population is one-third the size of our over-60 population. We are coming up against critical shortages in the face of impending retirements.

What we have done in our vision of the future and its mission roadmap is to make education a core mission element. I repeat... we have made education a core mission element for NASA.

This is not only self-sustaining for our own mission, but also a very real necessity for the country if we are to remain economically secure.

As we saw in the aftermath of September 11, our economic security has a direct relationship to our national security standing.

Our renewed focus to education means not only inspiring our youth but also providing educators with the tools they need to teach math and science and to improve the country's scientific literacy—and we have those tools available today. We just need to be more creative in how to make them available to inspire our youngest generation to pursue these inquiries.

In short, we want to make science and discovery, exploration and research, **cool**—exciting for kids to want to learn more and draw on natural human inquisitiveness. And if we don't motivate our youngest generation now—in kindergarten and through high school—there is little prospect this generation will choose to pursue scientific disciplines later.

That brings me to the last part of the mission statement ... we do all these things ... **as only NASA can.**

NASA is the nation's leading research and technology organization. Our unique vantagepoint, from space, gives us tools and a perspective that is unparalleled and one that cannot be duplicated anywhere else.



The fact is that there are things that only NASA can do and they would not get done if NASA does not do them. But we have to avoid getting distracted with challenges that call for simply incremental or marginal improvements—we must be dedicated to overcoming limits by finding entirely new ways to achieve objectives.

The biggest difference is that the mission is **science-driven** and that it will be carried out in a new commitment to fiscal responsibility and wise use of our assets, and with the synergy that comes from working with other government agencies, industry and academia.

We will carry out these grand objectives under the program set out by the President in his management agenda. NASA, along with the rest of the federal government, will be:

- Citizen-centered;
- Results-oriented;
- Market-based, actively promoting innovation through competition;
- And by focusing on that which only NASA can do and avoid duplicating that which may be achievable elsewhere.

The President has called for a government that is active but limited; one that focuses on priorities and does them well.

That same spirit is being brought to the work of management reform.

Rather than pursue an array of management initiatives, the President has elected to identify the government's most glaring problems—and solve them.

The President's Management Agenda is a starting point for management reform, and the guide to NASA's own reform in the way we do business, improving performance and in the way we meet our objectives.

Let me say a few words about how our vision for the future and our mission statement, carried out under the terms of the President's Management Agenda, will affect what you will see coming from NASA in the next few years.

The big sea change is two-fold. First, as I said when I began this talk is the move to science-driven missions. We will let the science of exploration and discovery tell us where to go next. Second is to use technology to enable advances and to view this as step functions to facilitate greater achievements.

For example, there is a necessary link and connection between our human space flight program and our work in robotics. NASA must eliminate the stovepipes and build an integrated strategy that links human space flight and robotic space flight in a stepping stone approach to exploration and discovery.

The synergy this will create is truly exciting. Serendipity is a big player in invention and discovery ... so is thinking outside the box. Who knows what great things will come from having exobiologists work with human factors specialists? The possibilities are infinite.

And ... on the bean-counting side—which it has been observed that I focus on a lot—is the fact that this approach leverages our resources tremendously.

In the next few years you will see robotic precursor missions and crosscutting technologies developed to support exploration and learning on the part of both humans and robots.

I've told you a lot about our plans for the near term and for the future. In the end the big question is: What does America gain from NASA? In other words, why should you care about this?

In a nutshell, NASA's work

- Inspires Americans and unites people
- Gives us a deeper understanding of life, ourselves, and the universe
- Enables new industries by investing in new technologies
- Educates a new generation of leaders and explorers

But let's face it: the American people expect us to make good use of our resources—that is, our tax dollars. Our roadmap for the future does just that.

After the Mars mission setbacks, NASA undertook a very critical assessment of what happened and the process that lead to that failure.

We are undertaking a similar critical assessment started when it became clear that the space station program was over-budget and are making changes. We learn from our mistakes, correct the problems, and move on. This is what the American public expects us to do. After all ... we are blazing a trail—as Lincoln said—to “regions hitherto unexplored.”

We are doing things that have never been done before. Mistakes, incorrect estimates, unforeseen problems are going to happen. If everything were to move along without a hitch I would be suspicious that we are not being bold enough, not fulfilling our mandate to push the envelope.

We must live the ethos Teddy Roosevelt intoned a hundred years ago:

"Far better it is to dare mighty things to win glorious triumphs, even those checkered by failure, than to take rank with those poor spirits who neither enjoy much nor suffer much, because they live in the gray twilight that knows neither victory or defeat."

But a prudent exercise of risk management requires the focus on a few absolutes. First, we must be selective in our pursuits, which require NASA's unique talent. Being selective and focused assures that we concentrate on working through the risks.

Second, we need to establish "stretch goals" which will be risky by definition—but then again, if they weren't, others would be pursuing them. But in selecting goals we must be honest with ourselves as to the efforts and resources that will be required. And once attained, we must manage these outcomes responsibly and continually improve performance.

Inspiration is born of understanding. Knowing more about our origins as observed in the far reaches of space billions of light years away is important for the human spirit and for understanding our place in the universe. It is the nature of the human spirit to want to know more. This is NASA's noble mission—to know more so that we can understand ourselves.

As I've been telling you today, NASA has to do things differently in the future. One fundamental difference is a need to find new ways to explore the galaxy.

Conventional rockets and fuel simply aren't practical as we reach further out into the cosmos. That's why we are launching an initiative to explore the use of nuclear propulsion.

One of the major obstacles of deep space travel is finding fast and efficient ways to get around ... to get to anywhere. Today's spacecraft travel at speeds slightly faster than John Glenn's Friendship 7 did 40 years ago.

NASA has explored the use of solar sails and ion engines as alternatives to conventional fuels, but their uses are limited and restricts us to very close-in objectives ... or if used for deep space exploration, require us to wait a long time before we see results—a minimum of 10 years, for example, to get to the edge of our own solar system, and a lot longer if we miss the "sling shot" effect of optimum planet alignment.

So the nuclear propulsion initiative is the next logical step to overcome this technology limitation. It's a mature technology and its application to space travel has great potential.

The US Navy has been operating nuclear powered vessels since 1955. In that time, the Navy has sailed more than 120 million miles without incident ... and has safely operated these efficient power generators for more than 5,000 reactor-years. And throughout that time, the Navy has designed more compact, safer, and more efficient reactors, which last the 40-year life of the vessels without refueling.

The technology is there. We just need to take it to the next step to increase speed and on-orbit time ... thereby beginning to overcome this persistent technical limitation.

If we're going to pioneer the future as only NASA can, we're going to need new ways to get us there.

Not a day goes by without our receipt of inquiries from young people who want to work for NASA. "What should I study," they ask. "How can I go to work for NASA," they ask. Clearly we are inspiring the next generation of explorers already ... but we need to do a lot more ... now more than ever.

A theme I've sought to weave through the talk today has been the contributions and dedication of our people. This is why we have made not only inspiration, but also education, a core mission component. This is vital to our country.

In that regard, NASA has an unfinished mission. The mission was begun in 1986 ... but it ended in tragedy for seven families, for the NASA family, and for the world.

The January 28, 1986, accident that resulted in the loss of the Space Shuttle Challenger and its crew—Francis Scobee, Michael Smith, Judith Resnik, Ellison Onizuka, Ronald McNair, Gregory Jarvis, and Christa McAuliffe—brought to a halt one of NASA's most important initiatives—the Teacher in Space program.

Christa McAuliffe had embarked on a history-making journey whose purpose was to take our children ... and the rest of us ... on a journey of learning that only NASA could make possible. She carried with her the imagination and hopes of school children and adults from around the world. The tragic events of that day marked us all.

There is no question that educators have a profound impact on young people. Every one of us has a personal memory of a teacher—in elementary school, perhaps, or high school—who we remember to this day. We all have a personal story about a teacher who introduced us to a

new concept—the works of Shakespeare, perhaps, or the order and precision of the world of mathematics.

After our parents, no adults have a greater impact on us during our formative years than our teachers.

Similarly, few things catch the imagination of young people as readily as the space program. I can tell you this from experience.

Just a few weeks ago our astronauts on the International Space Station—Carl Walz and Dan Bursch—were kind enough to remember my birthday. The surprised me by calling me at home ... from space. Unfortunately, I didn't know this was coming so I wasn't home when they called. They left a message on the answering machine.

My two sons got home before I did and played back the messages. By the time I got home, I had a house full of kids listening to the message from space over and over again. Do kids get excited about space? You bet they do.

It is time for NASA to complete the mission—to send an educator into space to inspire and teach our young people.

To achieve that goal, shortly after completion of the core elements of the International Space Station, expected in 2004, I am pleased to announce Barbara Morgan has been selected to begin her mission as the first Educator Mission Specialist.

Mrs. Morgan's mission will be the first of a series of flights in the new Educator Mission Specialist Program. Working in partnership with Education Secretary Rod Paige, we will soon release the details of our national recruitment program for follow-on missions.

It is fitting that Mrs. Morgan be the first educator to complete this mission. She trained with the Challenger crew and was Christa McAuliffe's backup. Since the Challenger accident she has worked with NASA and countless science organizations, keeping alive Christa McAuliffe's inspiration and the dream of an Educator in Space program ... and she returned to the place she loves best ... the elementary school classroom in McCall, Idaho. She began her teaching career on the Flathead Indian Reservation in Montana after she graduated from Stanford.

But now Mrs. Morgan is well on her way to space. She has been training and working at the Johnson Space Center since 1998. NASA and the children of the world look forward to wishing Mrs. Morgan a hearty Godspeed as she lifts off to begin these most important missions at long last.

It is vital that we inspire our young people to learn **and** to teach. I have mentioned the alarming shortage of teachers qualified to teach science and math. I hope that NASA's new direction in this area—in the person of Barbara Morgan and those who will follow her—will result in a new crop of young, invigorated educators who see clearly the importance of their contribution to our society.

We will recruit teachers to educate students from the unique vantage point of space. There is no more important profession than that of teacher.

When I came home to find a house full of excited kids listening to my voicemail from space, I couldn't help but wonder how many of those kids—my sons included—will remember that voicemail as a turning point ... as the moment that they began to aspire to work in space or work on telescopes, or

work to design the next propulsion system for space exploration. How many more young lives can we affect by inspiring them with the wonder of the final frontier?

What is it that inspires folks to the wonders of exploration?

Like Dr. Charles Elachi... who at the age of 11 in a village in Lebanon first began to dream of space exploration. Today, he leads our Jet Propulsion Laboratory in California.

Or Dr. Ghassem Asrar, a first-generation Iranian who came to this country to pursue his interest in science, now leads NASA's Earth Science Enterprise.

Or the head of our human space flight program ... Fred Gregory ... growing up as a young African-American in Washington, DC, during segregation, appointed to the Air Force Academy, became a test pilot ... and a three-time Space Shuttle veteran.

A more recent explorer, take Dr. Andrea Donnellan. She was awarded the Presidential Early Career Award recently for her breakthrough study of earthquakes using global positioning technology at the Jet Propulsion Laboratory. She is the face of NASA's future science.

Or finally ... Kelvin Manning, who can be found in the front row of the Firing Room at the Kennedy Space Center. This former Eagle Scout was recently honored with the 2002 Black Engineer of the Year Award.

Something inspired each of them ... and many others in NASA ... to come from their very diverse backgrounds and join in humankind's quest to know more, to explore, to push the envelope.

So, while we can marvel at the hardware we fly to space and the dramatic images our mission capture ... we have to remember that it's the people who make it all worthwhile.

From the astronauts ... to the scientists ... to the engineers ... to the people who provide administrative support ... and now, to the educators ... this agency's greatest strength is the people who devote their lives to NASA.

We have an obligation—in fact, a sacred trust—to keep that spirit alive, to ensure that there **will** be a next generation of explorers.

This is NASA's new vision for the future:

- To improve life here,
- To extend life to there,
- To find life beyond

This is the roadmap our people will follow into this new millennium.

These are exciting times. We are on the threshold of discovery and we hope to take you on that journey into the future.

We will pioneer the future. And, as Lincoln tasked us, we will “disdain the beaten path and seek regions hitherto unexplored.”

Thank you for your support and for having me here to speak with you today.

- end -